IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Appellants:	CHHEDA, et al.	Patent Application	
Application No.:	10/623,417	Group Art Unit:	2116
Filed:	July 18, 2003	Examiner:	Du, Thuan N.

For: RACK-LEVEL POWER MANAGEMENT OF COMPUTER SYSTEMS

APPEAL BRIEF

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I. Real Party in Interest

The assignee of the present application is Hewlett-Packard Development Company, L.P.

II. Related Appeals and Interferences

There are no related appeals or interferences known to the Appellants.

III. Status of Claims

Claims 4 and 18 have been cancelled. Claims 1-3, 5-17 and 19-23 are pending.

Claims 1-3, 5-17 and 19-23 are rejected. This Appeal involves Claims 1-3, 5-17 and 19-23.

IV. Status of Amendments

All proposed amendments have been entered. An amendment subsequent to the Final Action has not been filed.

V. Summary of Claimed Subject Matter

Independent Claim 1 recites, "A system (100, 200) for power management of a rack (100-1, 100-2..100-(N-1), 100-N) of computers (100-1, 100-2..100-(N-1), 100-N)," which is described at least at Figure 1; Figure 2; page 4 line 16 to page 5 line 22; page 5 line 23 to page 8 line 3. Server side infrastructure (SSI) circuitry (100) at each computer (100-1, 100-2..100-(N-1), 100-N) in the rack (100-1, 100-2..100-(N-1), 100-N), the SSI circuitry (100) including local monitoring circuitry (104) coupled to a central processing unit (CPU) (102) of the computer," which is described at least at Figure 1; Figure 2; page 4 line 16 to page 5 line 22. "A centralized power management module (CPMM) (202) with an out-of-band (OOB) management link (114) to the SSI circuitry (100) at each computer (100-1, 100-2..100-(N-1), 100-N) in the rack (100-1, 100-2..100-(N-1), 100-N)," is described at least at Figure 1; Figure 2; page 5 lines 14-15. "Wherein the CPMM (202) is configured to monitor power being consumed by the CPUs (102) by sending a polling message to the SSI circuitry (100) at each computer (100-1, 100-2..100-(N-1), 100-N) in the rack (100-1, 100-2..100-(N-1), 100-N)," is described at least at Figure 1; Figure 2; page 5 lines 9-11; page 6 line 4. "Wherein the local monitoring circuitry (104) within the SSI circuitry (100) at each computer (100-1, 100-2..100-(N-1), 100-N) in the rack (100-1, 100-2..100-(N-1), 100-N) is configured to monitor power consumption and temperature at the CPU (102) and to respond to the polling message from the CPMM (202) by transmitting a power consumption value and a temperature consumption value to the CPMM (202)," is described at least at Figure 1; Figure 2; page 4 lines 33-26; page 5 lines 8-15; page 7 lines 24-31; page 4 lines 27-28; page 5 lines 11-13. "Wherein the CPMM (202) is further configured to apply a set of rules to the consumption and temperature values from the local monitoring circuitry (104) to determine when and at which computers to enable and disable a CPU (102) power throttling mode and when at

which CPUs (102) to apply thermoelectric cooling," is described at least at Figure 1; Figure 2; page 8 lines 10-14; page 6 lines 10-28; page 4 lines 31-33.

Independent Claim 12 recites, "A server-side apparatus (100) for a rack-mounted computer (100-1, 100-2..100-(N-1), 100-N)," which is described at least at 100, Figure 1; page 4 line 16 to page 5 line 22. "Local monitoring circuitry (104) coupled to a central processing unit (CPU) (102) of the computer and coupled to a centralized power management system (202) which is configured to manage power and temperature for a rack (100-1, 100-2..100-(N-1), 100-N) of computers (100-1, 100-2..100-(N-1), 100-N)," is described at least at Figure 1; Figure 2; page 5 line 23 to page 8 line 3; page 4 lines 23-26; page 5 lines 8-15; page 7 lines 24-31. "Wherein the local circuitry (104) is configured to monitor power consumption and temperature at the CPU, transmit power consumption and temperature data to the centralized power management system (202), receive out-of-band (114) polling messages from the centralized power management system, respond to the polling messages by transmitting a power consumption value and a temperature value to the centralized power management system (202), and send commands to enable and disable a power throttling mode and to apply thermoelectric cooling at the CPU (102)," is described at least at Figure 1; Figure 2; page 4 lines 23-26; page 5 lines 8-15; page 7 lines 24-31; page 6 line 4; page 4 lines 27-28; page 4 lines 31-33; page 6 lines 14-16.

Independent Claim 16 recites, "A central power management apparatus for a rack of computers," which is described at least at Figure 2; page 5 line 23 to page 8 line 3. "A management module (202) coupled via an out-of-band link (114) to local monitoring

circuitry (104) at each computer (100-1, 100-2..100-(N-1), 100-N) in the link (104)," is described at least at Figure 1; Figure 2; page 5 lines 14-15. "Wherein the management module (202) is configured to transmit polling messages to the local monitoring circuitry, receive temperature values from the local monitoring circuitry (104) in response to the polling messages, determine at which computers (100-1, 100-2..100-(N-1), 100-N) to enable and disable a CPU power throttling mode and at which computers (100-1, 100-2..100-(N-1), 100-N) to apply thermoelectric cooling, and transmit messages to said determined computers (100-1, 100-2..100-(N-1), 100-N) to enable and disable the CPU power throttling mode and messages to said computers (100-1, 100-2..100-(N-1), 100-N) to apply the thermoelectric cooling," is described at least at Figure 1; Figure 2; page 5 lines 9-11; page 6 line 4; page 8 lines 10-14; page 6 lines 10-28; page 4 lines 31-33.

Independent Claim 17 recites, "A method for efficient temperature management of a rack (100-1, 100-2..100-(N-1), 100-N) of computers (100-1, 100-2..100-(N-1), 100-N)," which is described at least at 100, Figure 1; Figure 2; page 4 line 16 to page 5 line 22; 202, Figure 2; page 5 line 23 to page 8 line 3. "Monitoring temperature at each computer (100-1, 100-2..100-(N-1), 100-N) in the rack," which is described at least at page 7 lines 24-31. "Receiving polling messages at each computer in the rack (100-1, 100-2..100-(N-1), 100-N)," is described at least at page 5 lines 9-11; page 6 line 4. "Responding to the polling messages by transmitting a temperature value from each computer (100-1, 100-2..100-(N-1), 100-N) to the rack (100-1, 100-2..100-(N-1), 100-N) to a single centralized power manager (202)," is described at least at Figure 1; Figure 2; page 7 lines 24-31; page 5 lines 11-13. "Receiving messages from the single centralized power manager (202) which instruct each computer

(100-1, 100-2..100-(N-1), 100-N) when thermoelectronic cooling is to be applied," is described at least at page 7 lines 24-31.

Independent Claim 20 recites, "A centralized method of efficient temperature management for a rack (100-1, 100-2..100-(N-1), 100-N) of computers," which is described at least at Figure 1; Figure 2; page 5 line 23 to page 8 line 3. "Transmitting polling messages to local monitoring circuitry at each of the computers (100-1, 100-2..100-(N-1), 100-N) in the rack," is described at least at page 5 lines 9-11; page 6 line 4. "Receiving responses to the polling messages from the local monitoring circuitry at each of the computers (100-1, 100-2..100-(N-1), 100-N) in the rack, wherein the responses include temperature values," is described at least at page 4 lines 23-26; page 5 lines 8-15; page 7 lines 24-31. "Determining at which computers to apply thermoelectric cooling," is described at least at is described at least at page 7 lines 24-31. "Transmitting messages to said determined computers to apply said thermoelectric cooling," is described at least at is described at least at page 7 lines 24-31.

Independent Claim 22 recites, "A power management apparatus for managing power usage of a rack of computers," which is described at least at Figure 1; Figure 2; page 5 line 23 to page 8 line 3. "means for transmitting polling messages to local monitoring circuitry," is described at least at page 5 lines 9-11; page 6 line 4. "Means for receiving responses to the polling messages from the local monitoring circuitry at each of the computers in the rack, wherein the responses include root mean squared power consumption values and temperature values," is described at least at page 4 lines 23-26; page 5 lines 8-15; page 7 lines 24-31. "Means for determining at which computers to enable and disable a CPU power throttling mode and for determining at which computers to apply thermoelectric cooling," is described

at least at page 4 lines 31-38, page 6 lines 14-16, and page 7 lines 24-31. "Means for transmitting messages to said determined computers to enable and disable the CPU power throttling mode and to apply said thermoelectric cooling," is described at least at page 4 lines 31-38, page 6 lines 14-16, and page 7 lines 24-31.

VI. Grounds of Rejection to Be Reviewed on Appeal

1. Claims 1-3, 5-15 and 22-23 are rejected under 35 U.S.C. §112, first paragraph, as failing to comply with the written description requirement.

2. Claims 1-3, 5-17 and 19-23 are rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent Application Publication No. 2002/0004912 by Fung (referred to hereinafter as "Fung") in view of U.S. Patent No. 6,836,849 by Brock et al. (referred to hereinafter as "Brock").

VII. Argument

1. Whether Claims 1-3, 5-17, 19-23 Comply With The Written Description Requirement Under 35 U.S.C. §112, first paragraph.

The Office Action states, "The specification does not disclose any embodiment which the local monitor circuit is configured to monitor both power consumption and temperature at the CPU, transmit both power consumption value and temperature value to the CPMM." Appellants respectfully traverse. At least at page 5 lines 8-15, original Claim 1, original Claim 12, the specification teaches the local monitor circuit is configured to monitor power consumption and transmit a root mean squared or other derived power consumption value to the CPMM. Further, at page 7 lines 24-31, the specification describes that the above design and architecture may be applied to cooling… that the local monitoring circuit 104 may be applied to monitor temperatures at various computers. In additional, additional cooling via a fan or thermoelectric cooler may be applied in response to an elevated temperature. Therefore, Appellants understand the specification to state that the above design and architecture, which describes and enables a local monitor circuit that is configured to monitor power consumption and transmit a power consumption value can also be configured to monitor temperate and transmit a temperature value. Accordingly, Appellants respectfully submit that Claims 1-3, 5-17 and 19-23 comply with 35 U.S.C. §112, first paragraph.

2. Whether Claims 1-3, 5-17, 19-23 are Unpatentable Under 35 U.S.C. §103(a) by Fung in view of Brock.

Appellants have reviewed the asserted art and respectfully submit that the embodiments as recited in Claims 1-3, 5-17 19-23 are not taught or rendered obvious by Fung and Brock, alone or in combination, in view of the following rationale.

Appellants respectfully submit that "[i]t is improper to combine references where the references teach away from their combination" (emphasis added; MPEP 2145(X)(D)(2); *In re Grasselli*, 713 F.2d 731, 743, 218 USPQ 769, 779 (Fed. Cir. 1983)). Appellants respectfully note that "[a] prior art reference must be considered in its entirety, i.e., as a whole, including portions that would lead away from the claimed invention" (emphasis in original; MPEP 2141.02(VI); *W.L. Gore & Associates, Inc. v. Garlock, Inc.*, 721 F.2d 1540, 220 USPQ 303 (Fed. Cir. 1983), *cert. denied*, 469 U.S. 851 (1984)). Further, Appellants respectfully submit that, "[w]ith regard to rejections under 35 U.S.C. 103, the examiner must provide evidence which as a whole shows that the legal determination sought to be proved (i.e., the reference teachings establish a *prima facie* case of obviousness) is more probable than not" (emphasis added) (MPEP 2142).

In particular, "if the proposed modification or combination of the prior art would change the principle of operation of the prior art invention being modified, then the teachings of the references are not sufficient to render the claims *prima facie* obvious" (emphasis added) (MPEP 2143.01(VI); *In re Ratti*, 270 F.2d 810, 123 USPQ 349 (CCPA 1959)). Further, "[i]f the proposed modification would render the prior art invention being modified unsatisfactory for its intended purpose, then there is no suggestion or motivation to make the

proposed amendment" (emphasis added) (MPEP 2143.01(V); *In re Gordon*, 733 F.2d 900, 221 USPQ 1125 (Fed. Cir. 1984)).

More specifically, Appellants respectfully submit that there is no motivation to combine the teachings of Malzbender and Jackson, because various combinations of the asserted art teach away from the suggested modification. For example, Appellants understand the combination of Fung and Brock to change each other's principles of operation, or to render each others' teachings unsatisfactory for their intended purposes, or a combination thereof as will be described in more detail.

For example, Fung states in 0109, "It is noted that although several of the nodes described conserve power, they do not compromise performance, as the cumulative combination of server modules is always maintained at or above minimum targeted performance…" (emphasis added). In contrast, Brock states at Col. 5 lines 29-31, "The controller may have limited actions that it may execute to achieve a particular power and performance management goal." Brock also states at Col. 5 lines 44-45, "Other customers may be inconvenienced by a quality of service parameter…" (emphasis added).

In a second example, Fung states in claim 30, "wherein said group of network devices treated as a single network device is power managed as a single network device." In contrast, Brock states at Col. 2 lines 23-26, "There is, therefore, a need for a power and performance management method and control system that may be applied to individual multiprocessor VLSI chips…" Brock also states at Col. 4 lines 58-50, "…then actions may be taken to keep the server operating at some reduced performance by adjusting individual processor unit frequency and voltage…"

Therefore, Appellants understand Fung and Brock to teach away from each other because Fung teaches that performance is always maintained and never compromised while Brock teaches that the controller has limited actions to achieve a particular power and performance management goal and that customers may be inconvenienced. Further, Appellants understand Fung and Brock to teach away from each other because Fung teaches that a group of network devices are power managed as a single network device, whereas Brock teaches managing individual multiprocessors and adjusting individual processor unit frequency and voltage.

For at least the reasons provided herein, Appellants submit that the embodiments recited by Claims 1-3, 5-17 and 19-20 of the instant application serial number 10/623,417 are patentable over Fung and Brock in that Fung and Brock cannot be combined to render the embodiments recited by the Claims 1-3, 5-17 and 19-20 obvious.

Conclusion

Appellants believe that the written description would enable one of ordinary skill in the art, at the time that application serial no. 10/623,417 as filed, to make and use the embodiments recited by Claims 1-3, 5-15, and 22-23. Further, Appellants submit that Claims 1-3, 5-15 and 19-23 are patentable over Fung and Brock, alone or in combination. As such, Appellants submit that Claims 1-3, 5-17, 19-23 are patentable over the asserted art.

Appellants respectfully request that the rejection of Claims 1-3, 5-17 and 19-23 be reversed. The Appellants wish to encourage the Examiner or a member of the Board of Patent Appeals to telephone the Appellants' undersigned representative if it is felt that a telephone conference could expedite prosecution.

Respectfully submitted,
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Dated: 11/25/2008

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VIII. Appendix - Clean Copy of Claims on Appeal

1. A system for power management of a rack of computers, the system comprising:

server side infrastructure (SSI) circuitry at each computer in the rack, the SSI circuitry including local monitoring circuitry coupled to a central processing unit (CPU) of the computer; and

a centralized power management module (CPMM) with an out-of-band (OOB) management link to the SSI circuitry at each computer in the rack,

wherein the CPMM is configured to monitor power being consumed by the CPUs by sending a polling message to the SSI circuitry at each computer in the rack,

wherein the local monitoring circuitry within the SSI circuitry at each computer in the rack is configured to monitor power consumption and temperature at the CPU and to respond to the polling message from the CPMM by transmitting a power consumption value and a temperature consumption value to the CPMM, and

wherein the CPMM is further configured to apply a set of rules to the power consumption and temperature values from the local monitoring circuitry to determine when and at which computers to enable and disable a CPU power throttling mode and when at which CPUs to apply thermoelectric cooling.

2. The system of claim 1, wherein the rack of computers comprise servers mounted in the rack.

3. The system of claim 1, wherein the rack of computers comprise a plurality of blade servers in a blade chassis.

5. The system of claim 1, further comprising:

a console coupled to the CPMM for user interaction.

6. The system of claim 5, wherein the console comprises a console connected locally to the CPMM.

7. The system of claim 5, wherein the console comprises a remote console coupled via a network to the CPMM.

8. The system of claim 5, wherein the system is configured to enable a user to setup the aforementioned rules by way of the console.

9. The system of claim 5, wherein the system is configured to enable a user to view power consumption data by way of the console.

10. The system of claim 1, further comprising:

additional CPMMs with management links to SSI circuitry at additional racks of computers; and

a power management system coupled to the plurality of CPMMs.

11. The system of claim 10, wherein the power management system is configured to enable a user to view power consumption data and to customize the sets of rules applied by the CPMMs.

12. A server-side apparatus for a rack-mounted computer, the apparatus comprising:

local monitoring circuitry coupled to a central processing unit (CPU) of the computer and coupled to a centralized power management system which is configured to manage power and temperature for a rack of computers,

wherein the local circuitry is configured to monitor power consumption and temperature at the CPU, transmit power consumption and temperature data to the centralized power management system, receive out-of-band polling messages from the centralized power management system, respond to the polling messages by transmitting a power consumption value and a temperature value to the centralized power management system, and send commands to enable and disable a power throttling mode and to apply thermoelectric cooling at the CPU.

13. The apparatus of claim 12, further comprising:

a power measurement link between the local monitoring circuitry and the CPU for monitoring power consumption at the CPU.

14. The apparatus of claim 13, further comprising:

an interrupt line between the local monitoring circuitry and the CPU for transmitting interrupt messages that enable and disable the power throttling mode at the CPU.

15. The apparatus of claim 13, further comprising:

a special register writable by the local monitoring circuitry and readable by the CPU to enable and disable the power throttling mode at the CPU.

16. A central power management apparatus for a rack of computers, the apparatus comprising:

a management module coupled via an out-of-band link to local monitoring circuitry at each computer in the link,

wherein the management module is configured to transmit polling messages to the local monitoring circuitry, receive temperature values from the local monitoring circuitry in response to the polling messages, determine at which computers to enable and disable a CPU power throttling mode and at which computers to apply thermoelectric cooling, and transmit messages to said determined computers to enable and disable the CPU power throttling mode and messages to said computers to apply the thermoelectric cooling.

17. A method for efficient temperature management of a rack of computers, the method comprising:

monitoring temperature at each computer in the rack;

receiving polling messages at each computer in the rack;

responding to the polling messages by transmitting a temperature value from each computer to the rack to a single centralized power manager; and

receiving messages from the single centralized power manager which instruct each computer when thermoelectronic cooling is to be applied;

19. The method of claim 17, wherein the rack of computers comprises a rack of servers.

20. A centralized method of efficient temperature management for a rack of computers, the method comprising:

transmitting polling messages to local monitoring circuitry at each of the computers in the rack;

receiving responses to the polling messages from the local monitoring circuitry at each of the computers in the rack, wherein the responses include temperature values;

determining at which computers to apply thermoelectric cooling; and

transmitting messages to said determined computers to apply said thermoelectric cooling.

21. The method of claim 20, wherein the rack of computers comprises a rack of servers.

22. A power management apparatus for managing power usage of a rack of computers, the apparatus comprising:

means for transmitting polling messages to local monitoring circuitry;

means for receiving responses to the polling messages from the local monitoring circuitry at each of the computers in the rack, wherein the responses include root mean squared power consumption values and temperature values;

means for determining at which computers to enable and disable a CPU power throttling mode and for determining at which computers to apply thermoelectric cooling; and

means for transmitting messages to said determined computers to enable and disable the CPU power throttling mode and to apply said thermoelectric cooling.

23. The apparatus of claim 22, wherein the means for transmitting messages comprise out-of-band links to the local monitoring circuitry.

IX. Evidence Appendix

No evidence is herein appended.

X. Related Proceedings Appendix

No related proceedings.